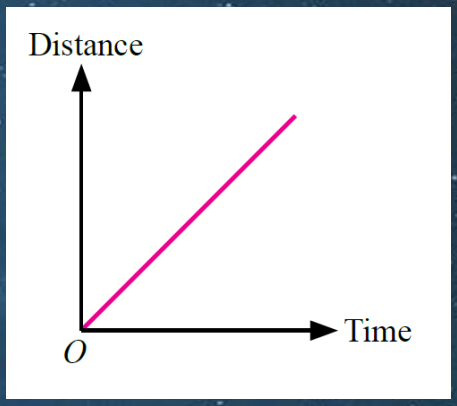
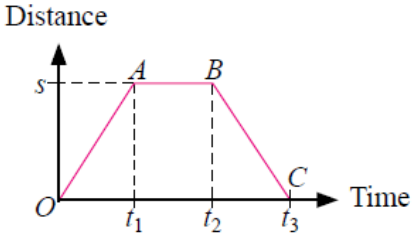
Graph Of Motion



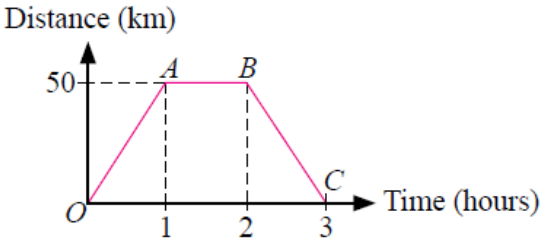
Distance-time graph

- The vertical axis represents distance
- The horizontal axis represents time
- The gradient of the graph represents the rate of change distance with respect to time, that is speed



- Gradient $= \dfrac{\text{Change in distance}}{\text{Change in time}}$

Rate of change in distance with respect to time = speed



(a) Speed of the object in the first hour or in the last hour

$= \dfrac{50 - 0}{1 - 0} = 50 \text{ km h}^{-1}$

(b) The object is stationary for 1 hour (AB)

Interpret distance-time graph

- OA – positive gradient-motion towards destination
- AB – zero gradient-stationary
- BC – negative gradient-motion towards origin
- Positive and negative speeds indicate opposite direction of motion

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$$

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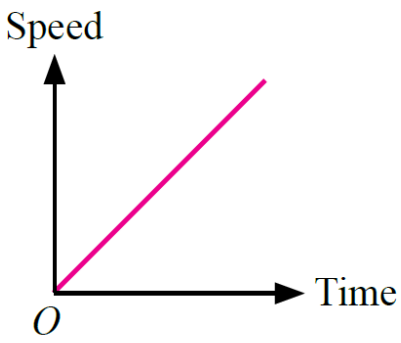
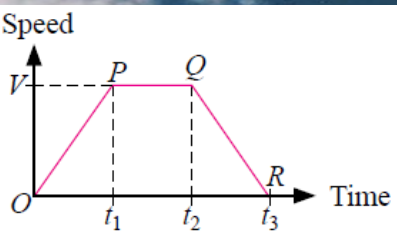
Graph Of Motion



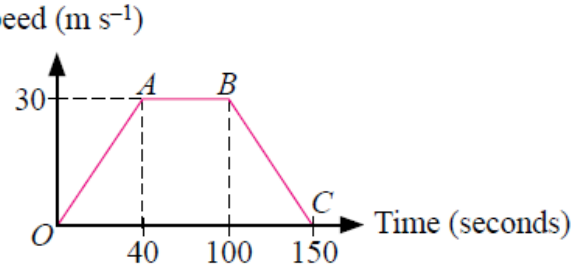
Speed-time graph

- The vertical axis represents the speed of a motion
- The horizontal axis represents the time taken
- The gradient of graph represents the rate of change of speed with respect to time, that is acceleration



- Distance travelled = Area under graph
- Gradient = $\frac{\text{Change of speed}}{\text{Change in time}}$

Rate of change of speed with respect to time = acceleration



(a) Acceleration in the first 40 seconds

$$= \frac{30 - 0}{40 - 0} = 0.75 \text{ m s}^{-2}$$

(b) Acceleration in the last 50 seconds

$$= \frac{0 - 30}{150 - 100} = -0.6 \text{ m s}^{-2}$$

(c) Uniform speed for 1 minute (AB)

Interpret speed-time graph

- OP – positive gradient, speed increases, acceleration
- PQ – zero gradient, no change of speed, uniform speed
- QR – negative gradient, speed decreases, deceleration

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$$

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